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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/805,824  
Filing Date: March 22, 2004  
Appellant(s): ZHENG, TIEYU

\_\_\_\_\_  
Michael A. Bernadicou  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed September 23, 2008 appealing from the Office action mailed February 26, 2008.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6,888,169	Malone et al.	5-2005
2001/0033592	Yamauchi et al.	10-2001

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 25, 26, 28, 29, 33, 34, 42-45** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamauchi et al. (2001/0033592), hereinafter '592, and further in view of Malone et al. (6,888,169)

Figs 5a and 11b of '592 discloses an optoelectronic module comprising:

25. "a substrate [2] defining a stepped upper surface having a lower portion and an upper portion, the substrate being configured such that a lower surface thereof determines a footprint of the module;

a thermo-electric cooler [3a] disposed on the substrate [2] and having a top portion [3] including a flat top surface, the flat top surface making up an entire top surface of the top portion and being substantially parallel to the lower surface of the substrate, the thermoelectric cooler further being disposed on the lower portion of the stepped surface;

a laser light source [1] disposed on the flat top surface of the top portion [3] of the thermo-electric cooler [3a] such that the thermo-electric cooler is disposed between the substrate [2] and the laser light source [1], wherein the thermo-electric cooler is further thermally coupled to the laser light source to cool the laser light source; and

an electrical connection [1c] extending from the upper portion of the upper surface of the substrate [2] to the laser light source [1]."

'592 discloses laser driver circuit 21 positioned outside the laser package and coupled to the laser diode 1 by means of an electrical connection 1a.

'592 does not disclose placing the laser light control device inside the laser package.

However placing the laser driver inside the optical package would have been obvious to one of ordinary skill in the art, since it is well know that longer wires introduce noise and instability into the system. Therefore, it is desirable to place the electrical components as close together as possible. '169 provides evidence of placing laser driver inside the optical package. Additionally, 6,747,820 discloses positioning integrated circuit inside the optical module adjacent to an opto-electronic component.

One of ordinary skill would have been motivated incorporate the teaching of '169 into the device of '592 by placing the laser driver on the upper surface of the substrate

in order to position the driver closer to the laser and reduce noise associated with long wires.

'592 and '169 disclose:

26. "further comprising a structure [cap] defining an enclosed environment and including the substrate, wherein:

the substrate [2] is at least partially disposed in the enclosed environment; and  
the thermo electric cooler [3a], the laser light source [1] and the electrical connection [1c] are disposed in the enclosed environment. (paragraph 0065)

27. "wherein the laser light control device [21] includes at least one of a driver and an amplifier.

29. "wherein the thermo-electric cooler [3a] includes a plurality of elongated thermo-electric elements and a bottom portion, the thermo-electric elements being disposed substantially in parallel between the top portion [3] and the bottom portion of the thermo-electric cooler, the top planar surface being substantially orthogonal to the thermo-electric elements.

33. "wherein the thermo-electric cooler [3a] and the upper portion of the stepped surface [2] are disposed such that the upper portion is substantially co-planar with a top surface [3] of the thermo-electric cooler.

34. "wherein the substrate [2] includes a substrate body comprising a one-piece component.

42. "wherein the laser light source [1] comprises a laser diode device.

43. "further including a cap [cap] partially defining the enclosed environment, the cap being disposed on the substrate [2]. (paragraph 0065)

44. "further comprising an overhanged ring disposed on a perimeter of the substrate [2] and supporting the cap [cap] thereon.

45. "wherein the cap [cap] includes an optical window [2a] adapted to facilitate an exit of laser light bundles [1a] from the enclosed space.

**Claim 41** is rejected under 35 U.S.C. 103(a) as being unpatentable over '592 and '169 as applied to claim 25 above.

'592 discloses an optoelectronic module as described above, but does not

disclose:

41. "wherein the thermo-electric cooler comprises a T-shaped bottom portion."

However, changing shapes of elements such as ceramic plates for the purposes of better fit inside a desired enclosure package is well known in the art.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of '592 by making the bottom portion of the TEC T-shaped for at least the purpose of accommodating the TEC inside an optical module of a desired shape.

#### **(10) Response to Argument**

A. Regarding appellant's argument that "the proposed modification of Yamauchi ('592) would render '592 unsatisfactory for its intended purpose":

1. Regarding appellant's argument that "changes in the environment temperature would affect laser diode differently from optical filter, since laser diode is temperature controlled by control circuit whereas optical filter is not", the examiner points to Figure 5A and paragraph 0057 of '592 that disclose a thermo-electric cooler (TEC) 3 that cools both the laser and the filter.

2. Regarding appellant's argument that "placing control circuit 21 at the interior of optical module 20 would destroy the purpose of balancing the temperature between laser diode 1 and optical filter 6", the examiner points out that the temperature balance between the laser and the filter would not be affected, since the heat that may be generated by the circuit would not affect the laser and the filter disproportionately. '592 also discloses a possibility, in paragraph 0022, of adding a separate TEC to control the filter, that will insure a temperature balance between the laser and the filter.

3. Regarding appellant's argument that "bonding wires are incapable of addressing the additional temperature disturbance caused by the heat generated by control circuit 21 within the optical module 20", the examiner points out that such statement by the appellant is not supported by the '592 reference. The bonding wires are designed to balance the temperature of the package 2 with the laser diode 1, their purpose would not be compromised by adding an additional element that may generate heat inside the optical module.

B. Regarding appellant's argument that "the Examiner's arguments in support of the proposed modification are flawed":

1. Regarding appellant's argument against the examiner's assertion that "a TEC can be placed underneath control circuit 21 to reduce heat":

1a. The appellant argued that if the circuit is placed on the TEC 3, claim 25 would not be anticipated, the examiner responds that her position is misinterpreted by this statement. In the response mailed on January 23, 2008 the examiner suggested placing an additional TEC underneath the circuit 21, in order to reduce the heat that may be generated by the circuit.

1b. The appellant argued that '592 "explicitly teaches away from having two separate TECs in optical module as such configuration involves complex construction and increased power consumption." The examiner responds that such disclosure by the reference does not constitute teaching away, on the contrary, examiner interprets such disclosure as an explicit admission that such a configuration would work, albeit in a more complex structure.

2. Regarding appellant's argument against the examiner's assertion that "raising the temperature inside optical module 20 by adding a circuit will not affect laser diode and optical filter disproportionately":

2a. The appellant argued "curiously, the Examiner has not explained how bonding wires will not affect laser diode 1 and optical filter 6 when the temperature inside optical module is raised". The meaning of this statement is not understood by the examiner.

2b. The appellant has argued that "the Examiner has ignored the teaching in '592 against introducing heat into the package body 2 other than from the environment via bonding wires 9". The examiner responds that she is unaware of such teaching in '592, on the contrary the reference discloses several heat generating elements inside the optical module.

2c. The appellant has argued that "the device will not function properly when excessive amount of heat is transferred from the environment via bonding wires 9 to the optical module." The examiner contends that this statement was taken out of context and

is not related to placing an object that may generate heat inside the module. In the next paragraph 0064 the reference discloses that the number of the bonding wires has to be carefully selected to alleviate this problem.

2d. The appellant has argued that '592 teaches that the space within the optical module is under vacuum or filled with gas of low thermal conductivity. The examiner interprets this statement as one more indication that placing a circuit that may generate heat inside the optical module would not have a detrimental effect on the operation of the laser module, since the heat generated by the circuit will be retarded from spreading through the module. Moreover, the cited paragraph 0067 also discloses that the filter is placed on thermally conductive holder 6b that is in contact with the TEC3 and the temperature of the filter is controlled by the Peltier element 3a

C. Regarding appellant's argument that "the Examiner has improperly relied on common knowledge":

1. Appellant argued that '592 "does not indicate any concern on signal integrity of connections between control circuit 21 and components of optical module". The examiner responds that the reference need not directly express a need for modification if such modification is already well known in the art as evidenced by Malone ('169). It would have been obvious to one of ordinary skill in the art to try the proposed modification of '592 in view of '169, for the obvious benefits of reducing noise, making a compact all-in-one unit, etc.

2. Appellant argued that '169 does not "suggest placing electrical components closely to avoid introducing noise and instability to the optical system". The examiner responds that the motivation for modification need not come directly from the references but from the general knowledge of one of ordinary skill of the art at the time of the invention. It is well know in the art that reducing wire length will reduce the noise associated with long wires, therefore one would have been motivated to place the laser driver in close proximity to the laser diode in order to avoid errors in the laser signals associated with noise in the wires.

3. Appellant argued that "components of a circuit generate noise and placing control circuit 21 inside optical module 20 would probably affect components in optical



module 20. For example, thermister 4a..." The examiner points out that the optical module 20 does not contain any other circuits or components that would be susceptible to the noise that may be generated by the circuit 21. The thermister 4a, is nothing more than a resistor that is connected to the circuit 21 and is used to determine change in resistance as voltage flows across it. Therefore the resistive component 4a would not be negatively affected by the placement of circuit 21 (that controls it) inside the module 20.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Marcia A. Golub/ Patent Examiner

Conferees:

Darren Schuberg /D. S./

TQAS TC 2800

/Minsun Harvey/  
Supervisory Patent Examiner, Art Unit 2828